HF RADIO ALE APPLICATION HANDBOOK

PREFACE

High frequency (HF) communications has been an essential part of worldwide information transmission since the advent of radio and has advanced nearly in step with information technology. Today, advanced thinkers in the field envision HF radio technology as embracing and supporting such technological advances as HF e-mail and compressed multimedia voice and data services. A guide has long been needed that brings together into one concise user's handbook all of the working knowledge of HF Automatic Link Establishment (ALE) radio technology. Many publications exist that deal with one or more aspects of this technology—sometimes in great detail. This guide, which is general in scope, provides a broad approach. It is a tutorial for explaining the basics of this HF ALE technology and for passing along working knowledge for hands-on operation of HF ALE systems. This guide is the product of many authors who have combined their considerable expertise. This document was edited by the Institute for Telecommunication Sciences (ITS), Boulder, Colorado. Technical contributions were received from Dr. John Goodman of TCI/BR Communications, from Harris Corporation, from Dr. Eric Johnson of New Mexico State University, and from Rockwell International. The editors secured written permission from the holders of the copyright when any copyrighted material was used herein.

In the United States, both the federal and military communities have produced standards to define the details necessary for interoperation among radios of different manufacture. Such interoperability is especially important in order (a) to fulfill specialized or cooperative missions, often one branch of the military service must communicate with a second branch, and (b) government agencies have a tradition of purchasing from only one manufacturer for reasons of familiarity. This standardization has been very important in the growth of HF ALE radio technologies: without standardization, inter-service communications over long distances might not be possible. But this standardization is burdened by the proliferation of special features which, when incorporated into the standard, result in bulky, unwieldy documents that are awkward to use because of their size. To address this problem of size, the authors of current standards are making a conscious effort to remove tutorial text from their documents. Hence the need for a handbook with tutorial material that is easy for the layman to read and that contains sufficient details for a basic understanding of HF ALE radio technology. This *HF Radio ALE User's Guide* addresses that need.

This guide begins with a brief introduction to the propagation properties that make HF radio work. That introduction sets the stage for later discussion about the propagation and physical media of HF radio. The introductory chapter identifies the ways in which HF ALE radio technology relieves the operator of much of the work associated with maintaining information on propagation conditions, tracking the stations with which communications are possible, and noting the frequencies that can be used for those communications. The introductory chapter also discusses the terms *automatic* and *adaptive*, which are an integral part of any discussion of HF ALE radio technology. The scope and definition of adaptive systems are identified to define the user's requirements that must be met despite the difficult propagation environment. The introduction also presents a brief historical perspective of HF radio to date, outlining its impact on the HF communication systems engineer. The introduction also identifies the automation and adaptive concepts described in detail later in the handbook. Finally, the introduction introduces the organization of the handbook.